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U. S. NAVAL TECHNICAL MISSION TO JAPAN  
CARE OF FLEET POST OFFICE  
SAN FRANCISCO, CALIFORNIA

29 December 1945

RESTRICTED

From: Chief, Naval Technical Mission to Japan.  
To : Chief of Naval Operations.

Subject: Target Report - Japanese Airborne Radar.

Reference: (a) "Intelligence Targets Japan" (DNI) of 4 Sept. 1945.

1. Subject report, covering Target E-02 of Fascicle E-1 of reference (a), is submitted herewith.

2. The investigation of the target and the target report were accomplished by Comdr. M. C. Mains, USN., Ret.



C. G. GRIMES  
Captain, USN

31760

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**E-02**

## **JAPANESE AIRBORNE RADAR**

**"INTELLIGENCE TARGETS JAPAN" (DNI) OF 4 SEPT. 1945**

**FASCICLE E-1, TARGET E-02**

**DECEMBER 1945**

**U.S. NAVAL TECHNICAL MISSION TO JAPAN**

# SUMMARY

## ELECTRONICS TARGETS

### JAPANESE AIRBORNE RADAR

The Japanese Navy had only three airborne radars of sufficient interest to merit detailed study. These were the Type 51, 10-centimeter pathfinder radar, the FD-2 night-fighter set on 500 Mc, and the Gyoku-3, 150 Mc, night-fighter set. None of these were in production, and the standard set in use was the Type 3, Air Mark 6, Model 4 (H-6), on 150 Mc.

There was an IFF set in development, the M-13, which was put into service on a small scale. About 600 sets were said to have been produced. The Japanese Army and Navy used different frequencies for their IFF, hence were unable to interrogate each other.

During the course of the investigation of this target, it was ascertained that the subject was being thoroughly covered by the Air Technical Intelligence Group of Far Eastern Air Forces, and to a lesser degree by the Technical Liaison and Investigation Department, Office of Chief Signal Officer. Accordingly, to avoid duplication of effort, all information discovered on airborne radar was made available to those agencies and none was uncovered which is not contained in the referenced reports of those agencies.

This report consists of schematic and block diagrams of Japanese airborne radar sets, including those mentioned above, and a chart of the characteristics of Japanese airborne radar. Details and discussion of this subject can be found in the referenced reports.

Electronic altimeters are covered in NavTechJap Report - "Japanese Navigational Aids", Index No. E-09.

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## REFERENCES

### Location of Target:

Second Naval Technical Institute, Kanazawa, YOKOHAMA.

Second Naval Technical Institute, Tokyo Branch, 13 Mita, Meguro-Ku, TOKYO.

### Japanese Personnel Interviewed:

Vice Adm. NAWA TAKESHI, IJN, Head of Radar and Communications Department, Second Naval Technical Institute, Kanazawa, YOKOHAMA and Meguro-Ku, TOKYO.

Capt. TAKAKARA HISAE, IJN, Head of Direction Finder and Airborne Radar Section, Second Naval Technical Institute.

Mr. Fred K. UYEMINAMI, Second Naval Technical Institute, RDF and Airborne Radar Section. Born in Seattle; graduated from University of Washington, 1933; graduate student at Massachusetts Institute of Technology. Later on staff of WASEDA University and consultant to Japanese Navy. Age, about 33. Speaks fluent English, and acted as interpreter during some of the interviews.

### Reports of Other Agencies:

Air Technical Intelligence Group, Electronics Section, Far Eastern Air Forces. (Copies to BuAer and Wright Field).

1. ATIG #14 - Radar and Communication Equipment (Airborne).
2. ATIG #35 - Aircraft Antenna Design,
3. ATIG #115 - A Short Survey of Japanese Radar (Vol VI).
4. ATIG #275 - Japanese IFF.
5. ATIG #276 - Catalog of Radio, Radar and Special Devices.
6. ATIG #277 - List of miscellaneous electronic documents (which were sent to Air Documents Division T-2 Wright Field).

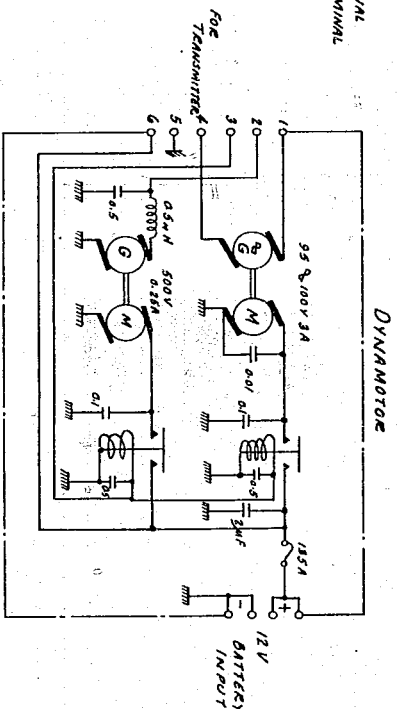
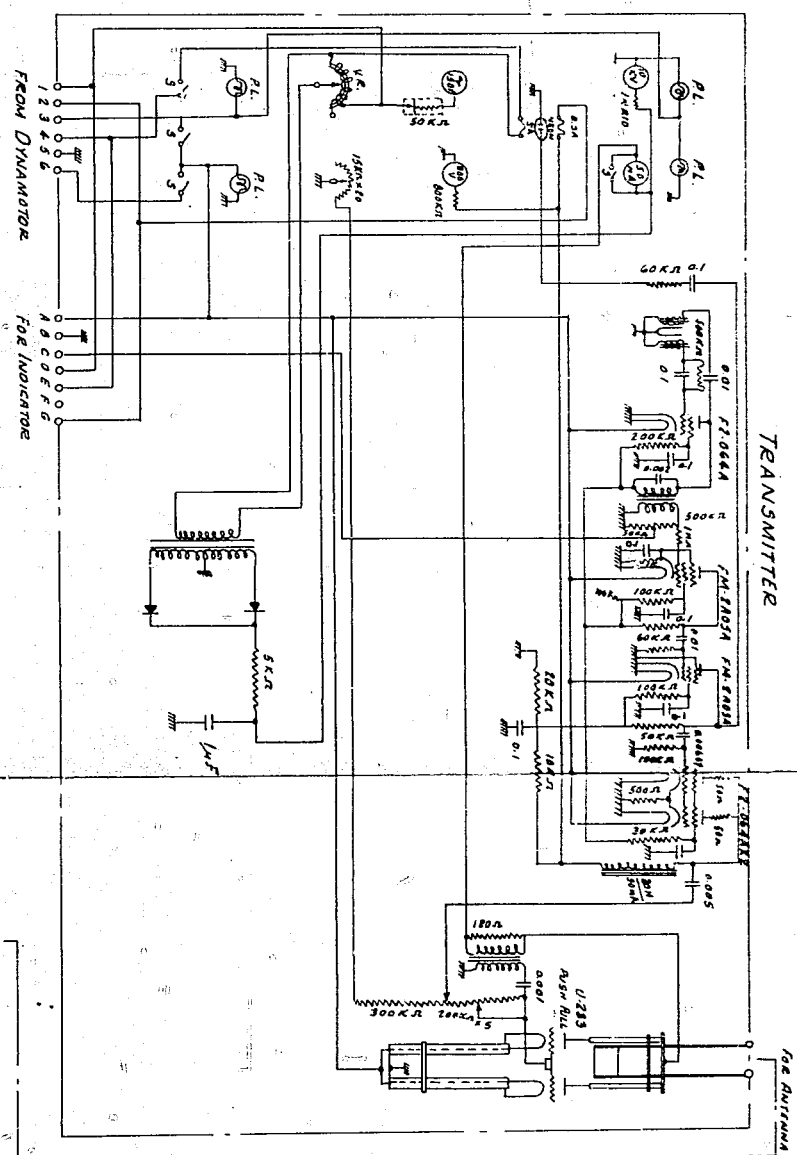
Technical Liaison and Investigation Department (TLID), Office of Chief Signal Officer, Supreme Commander for the Allied Powers (Available through G-2, War Department, Washington, D.C.).

### Equipment Seized By Air Technical Intelligence Group (Sent to Wright Field):

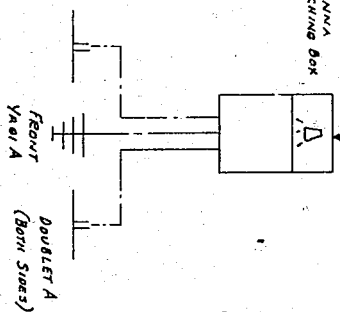
One FD-2 Equipment  
One Type 51 Equipment

**E-02**

## Type 3, Mk 6, Mod 4 (H-6) Radar,



FREQUENCY: —	150 MC (24)
OUTPUT: —	ABOUT 3 KW
PULSE LENGTH: —	ABOUT 10 MS
RANGE: —	ABOUT 60 MILES FOR A BIG SHIP
ACCURACY: —	$\Delta E$ ABOUT $\pm 5\%$
	$\Delta \theta$ ABOUT $\pm 5\%$



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BY THE RAQAR DEPARTMENT OF THE 2ND  
NAVAL TECHNICAL INSTITUTE OF JAPAN

## ENCLOSURE (A), continued

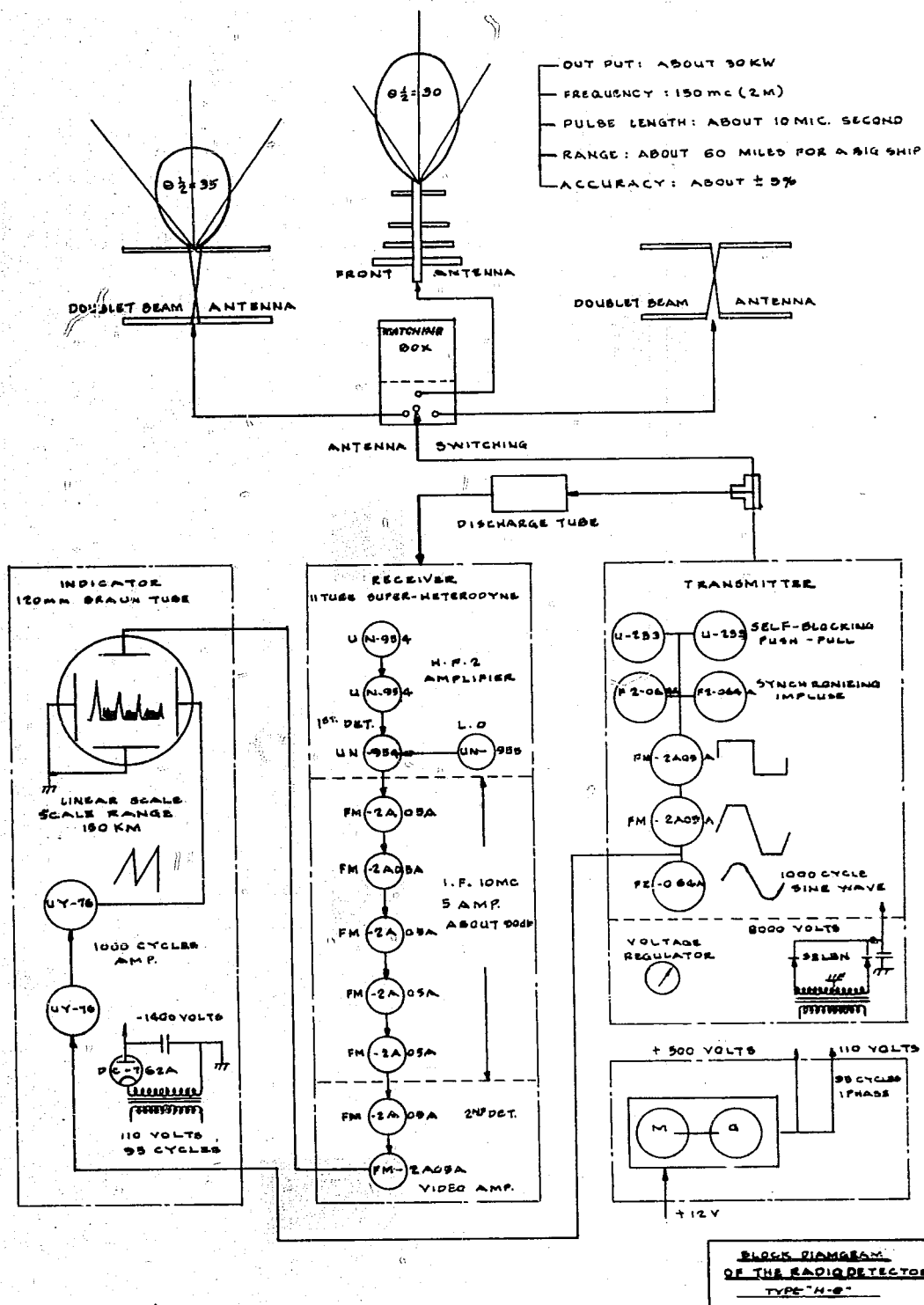
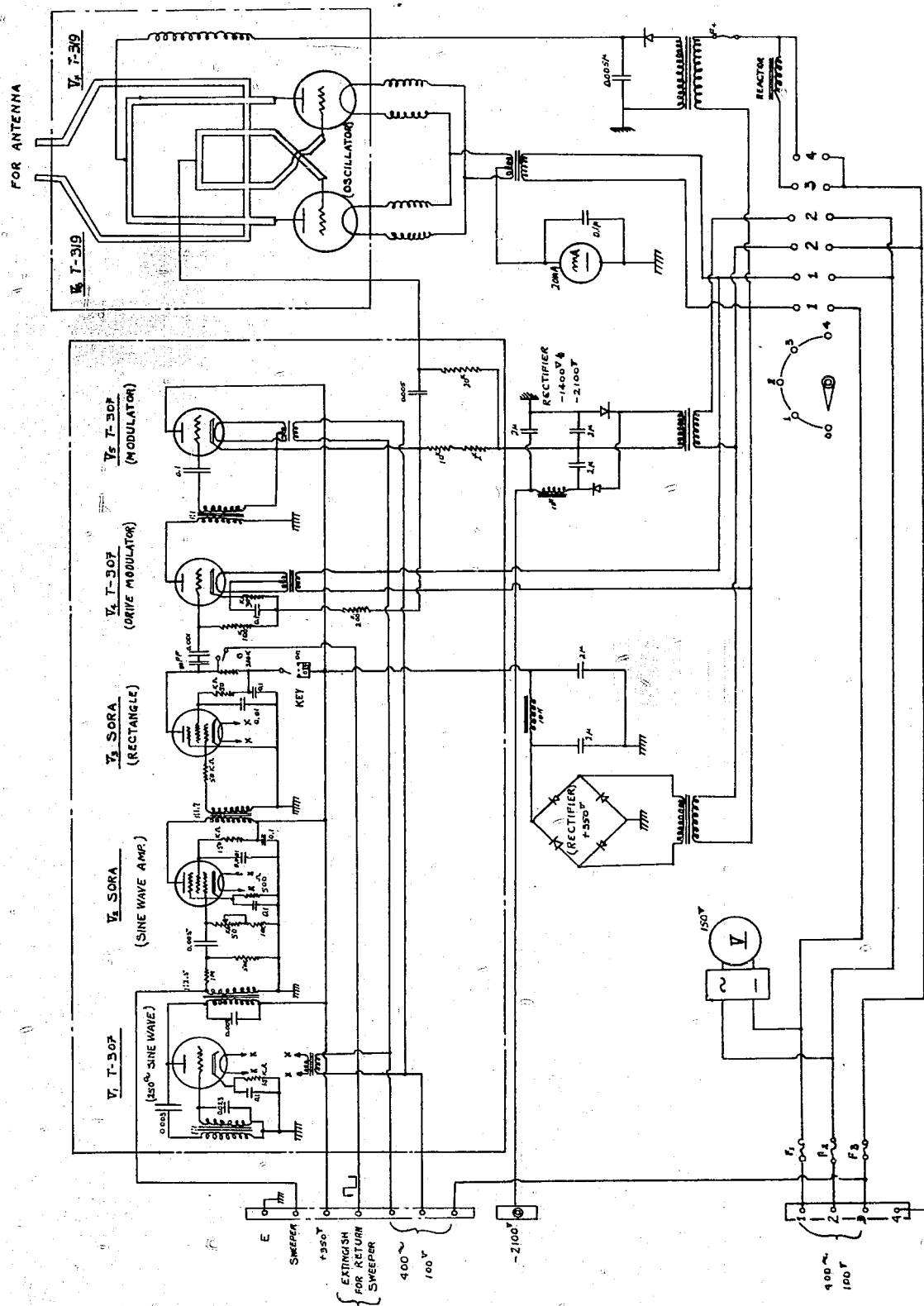


Figure 2(A)



## ENCLOSURE (B)

TYPE 4, MK 6, MOD 3 (FM-1) RADAR



ENCLOSURE (B), continued

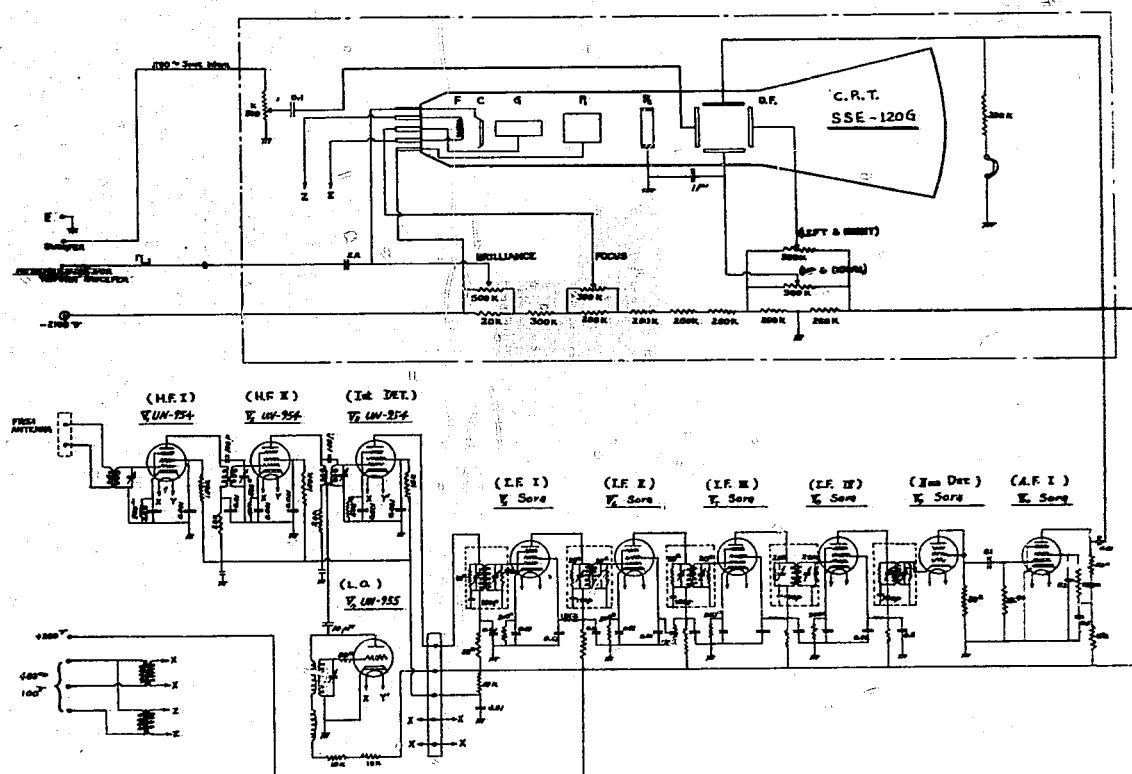


Figure 2(B)  
CONNECTION DIAGRAM OF THE TYPE "FM-1" RADAR (RECEIVING BOX)



## ENCLOSURE (C), continued

FK3

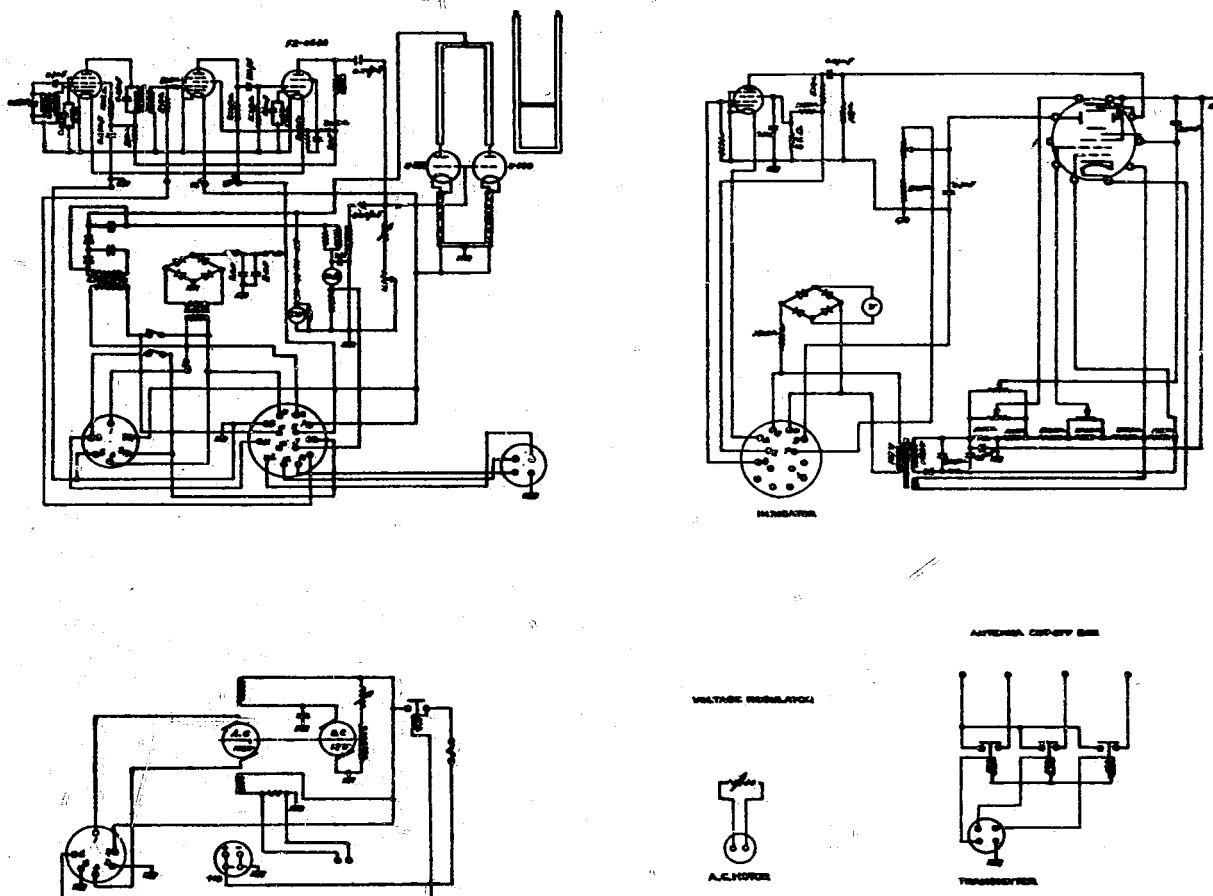


Figure 2(C)

AIRBORNE RADAR TYPE 19, MK 1, MOD 12 (FK-4)

## ENCLOSURE (C), continued

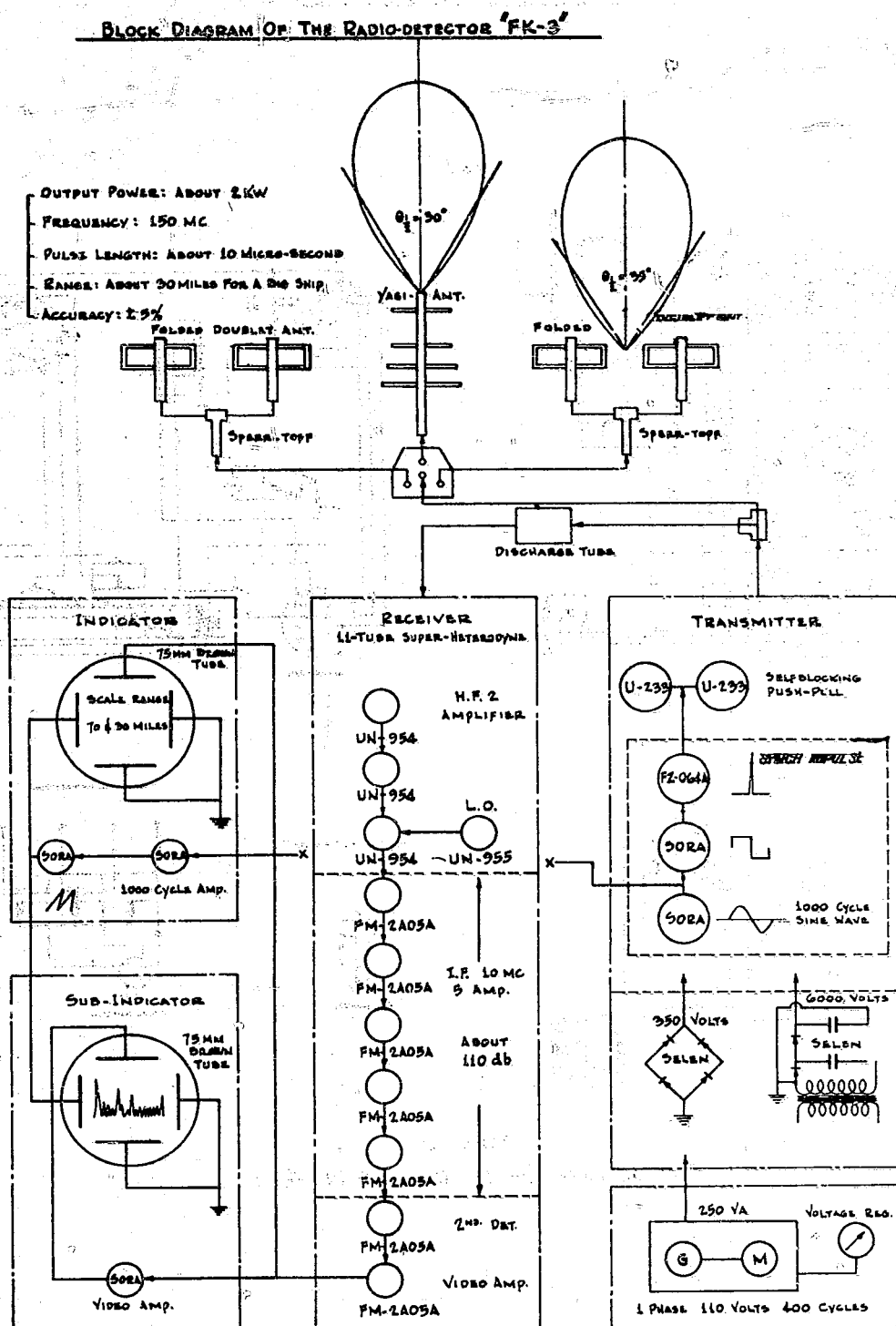
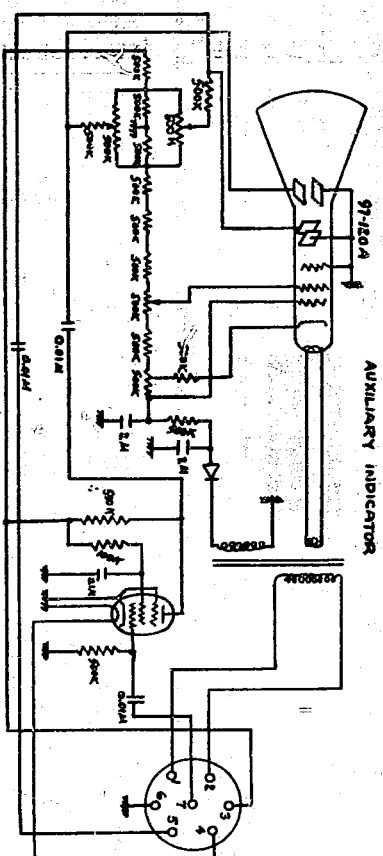
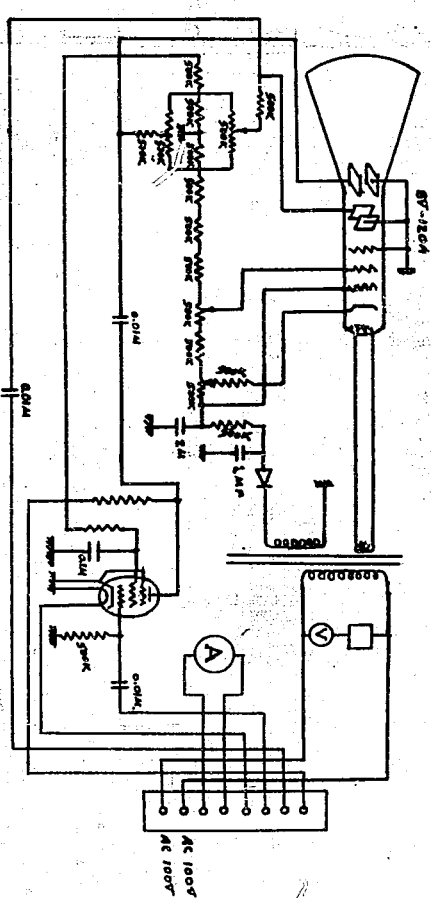
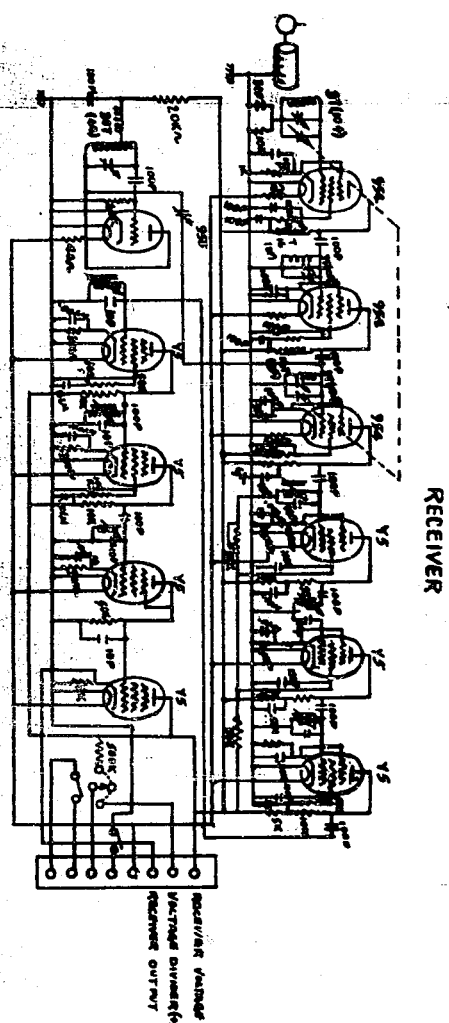
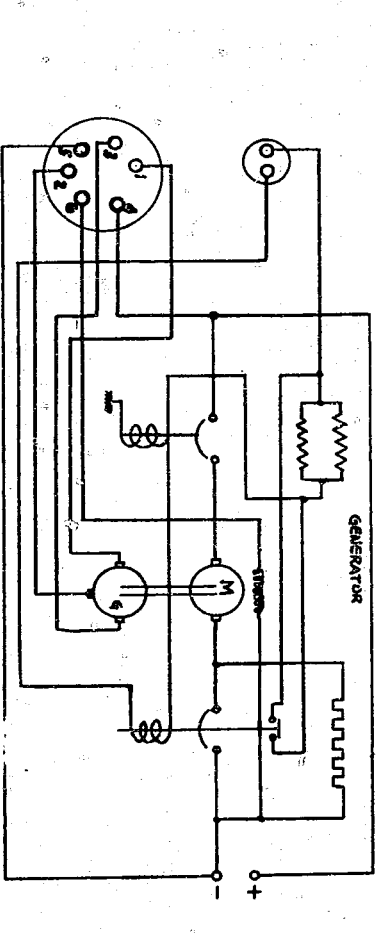
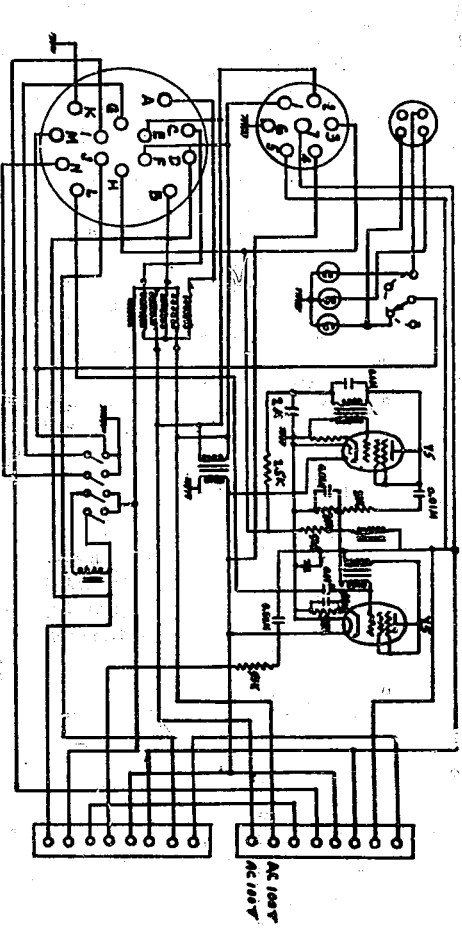
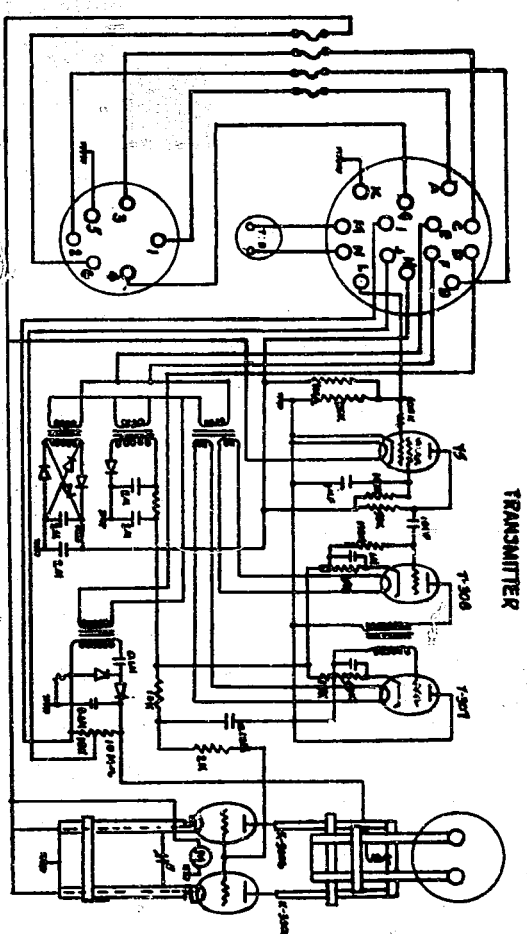


Figure 3(C)



## ENCLOSURE (D), continued

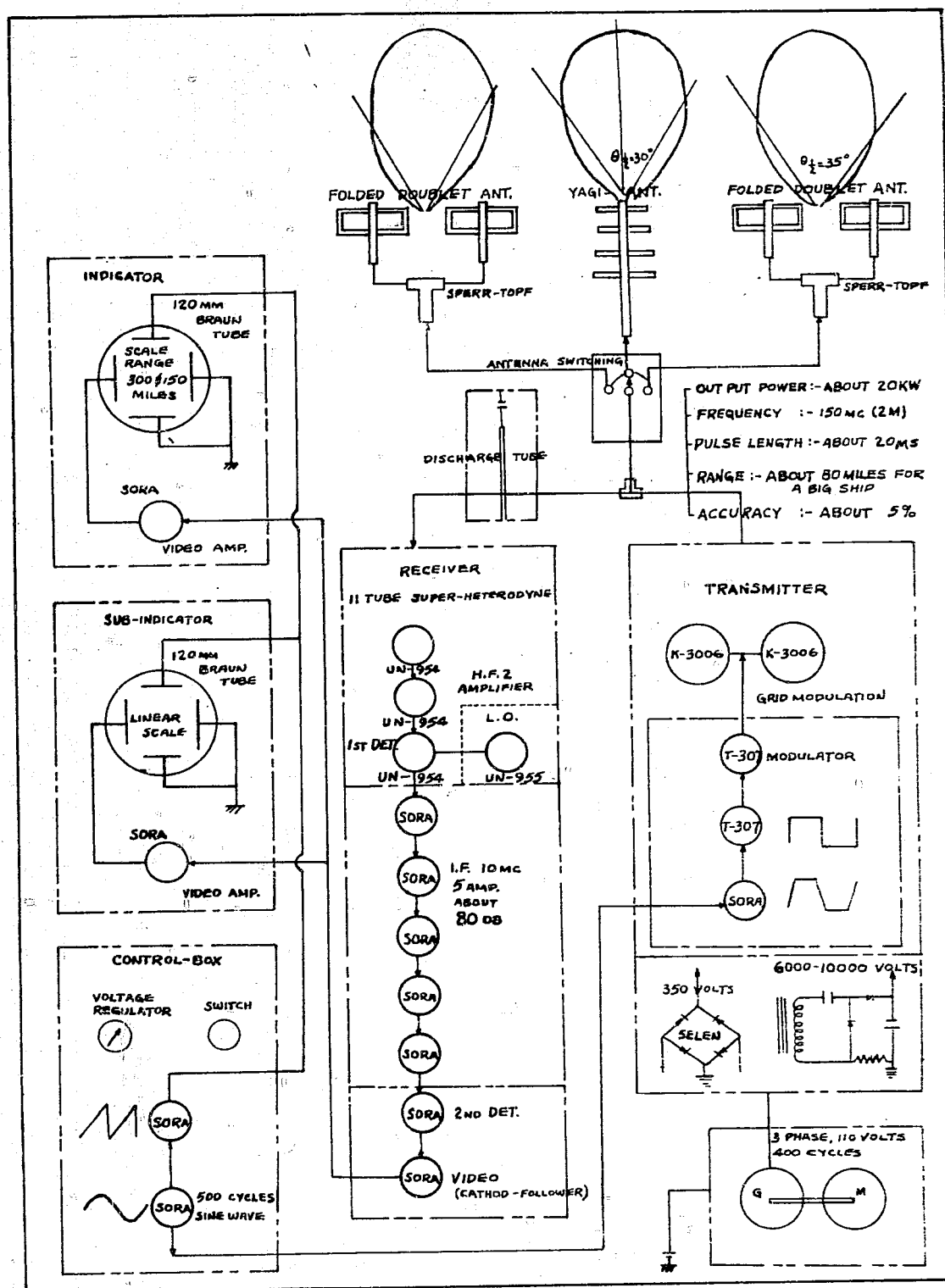
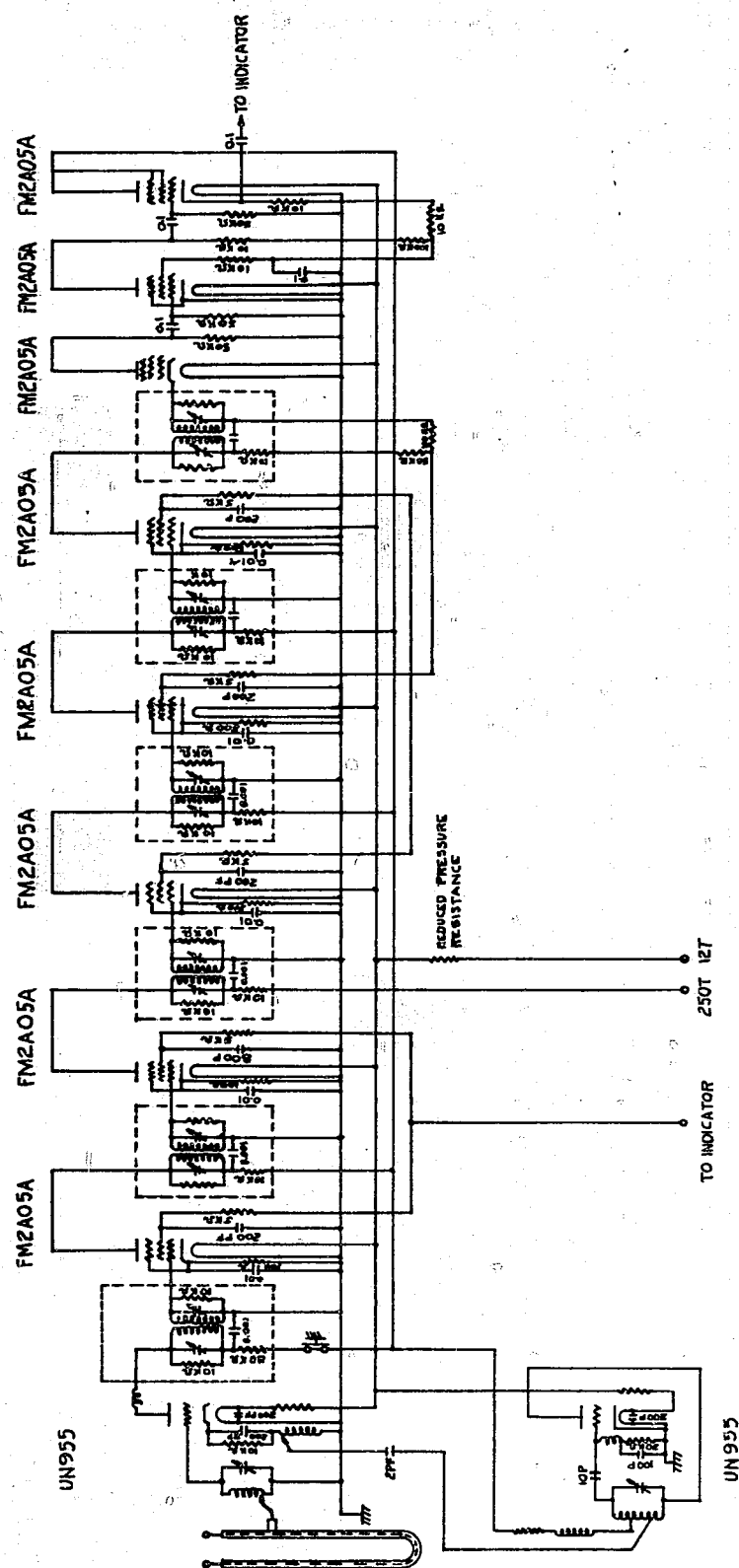


Figure 2(D)  
BLOCK DIAGRAM

## ENCLOSURE (E)

TYPE 19, MK 1, MOD 11 (N-6) RADAR



RECEIVER





ENCLOSURE (E), continued

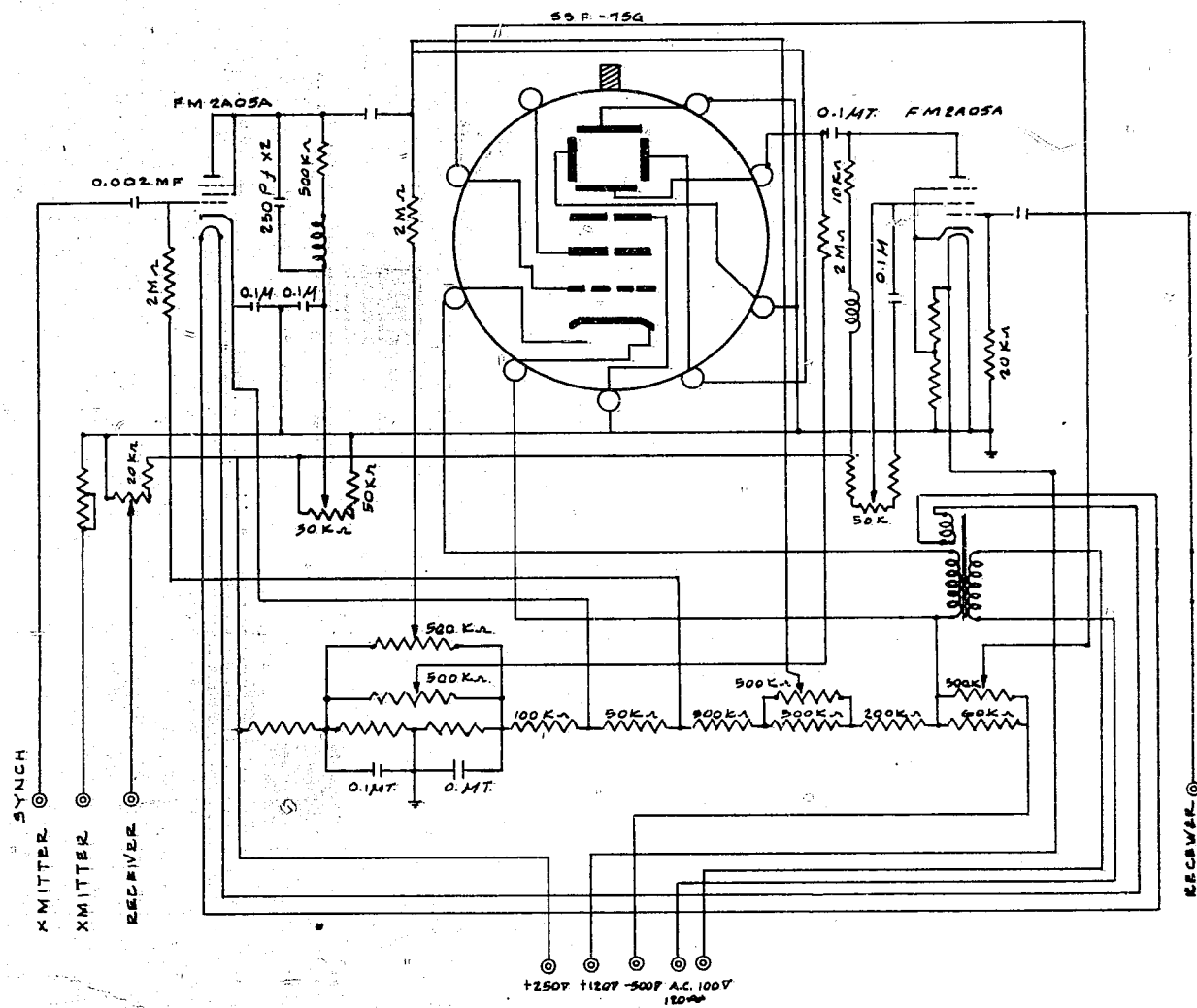
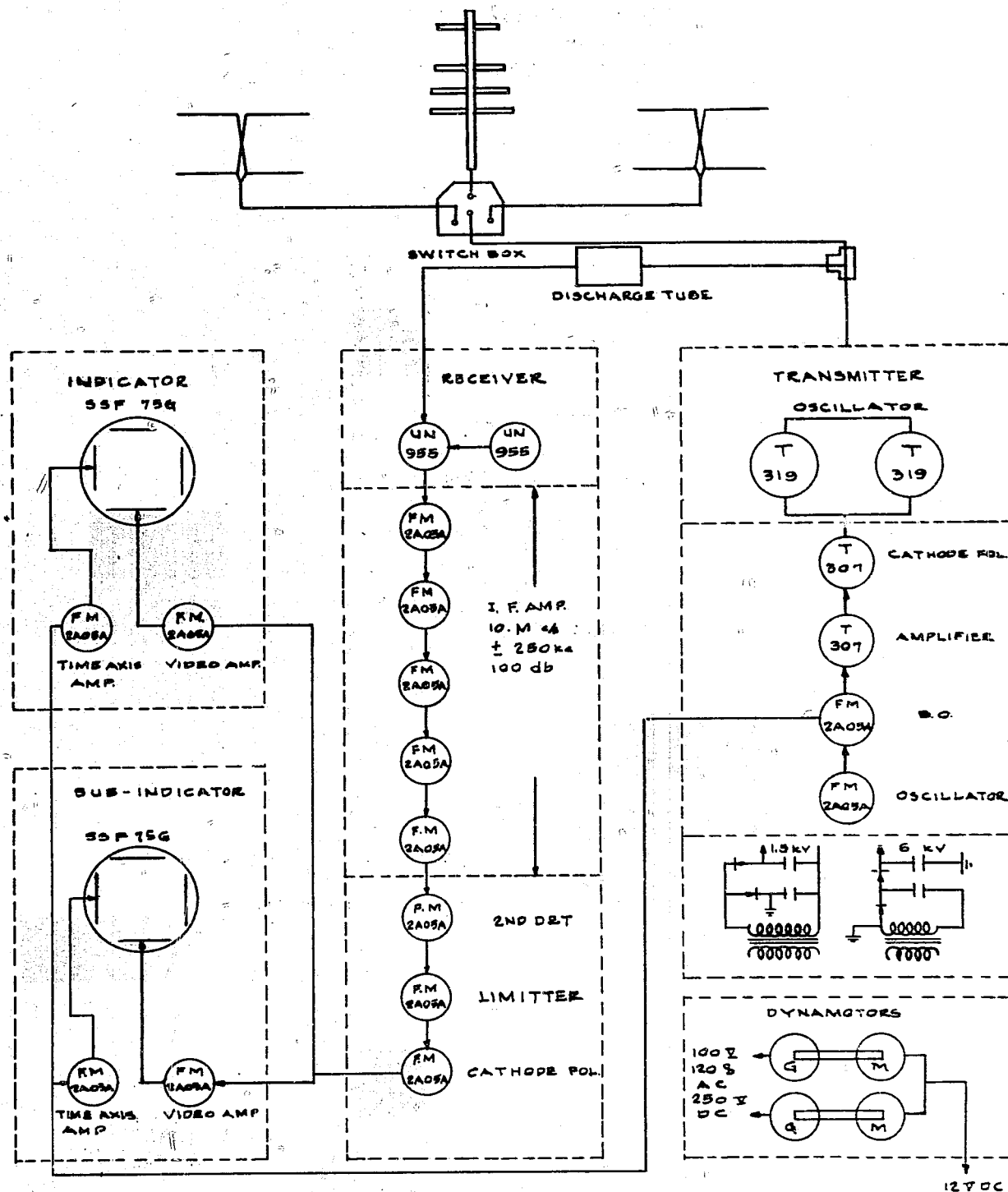


Figure 3(E)  
INDICATOR

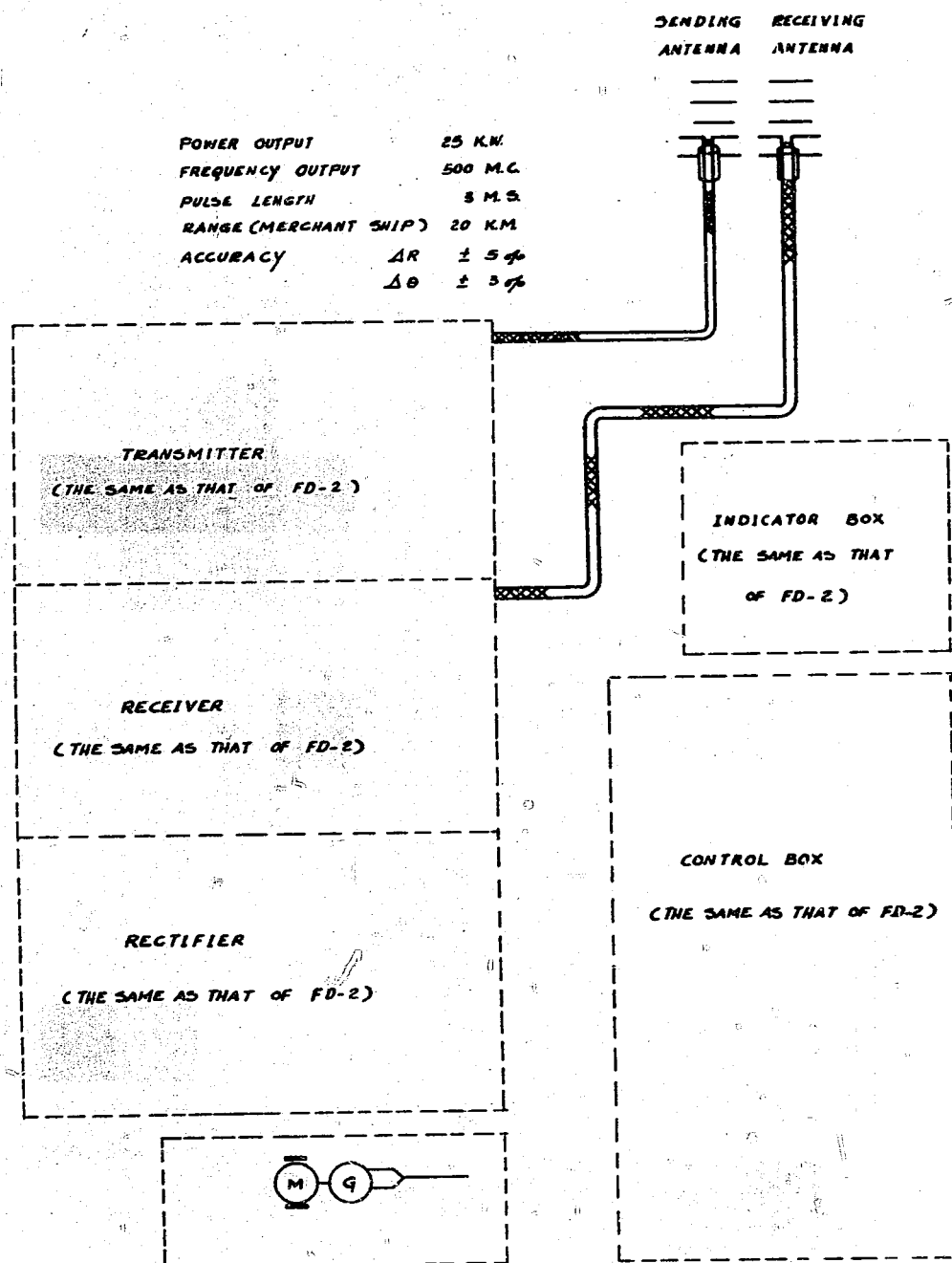


POWER OUTPUT	2 KW
FREQUENCY	250 Mc/sec.
PULSE LENGTH	7 $\mu$ SEC
RANGE	20 KM FOR A DESTROYER
ACCURACY	$\pm 5$ %

Figure 4(E)  
BLOCK DIAGRAM

## ENCLOSURE (F)

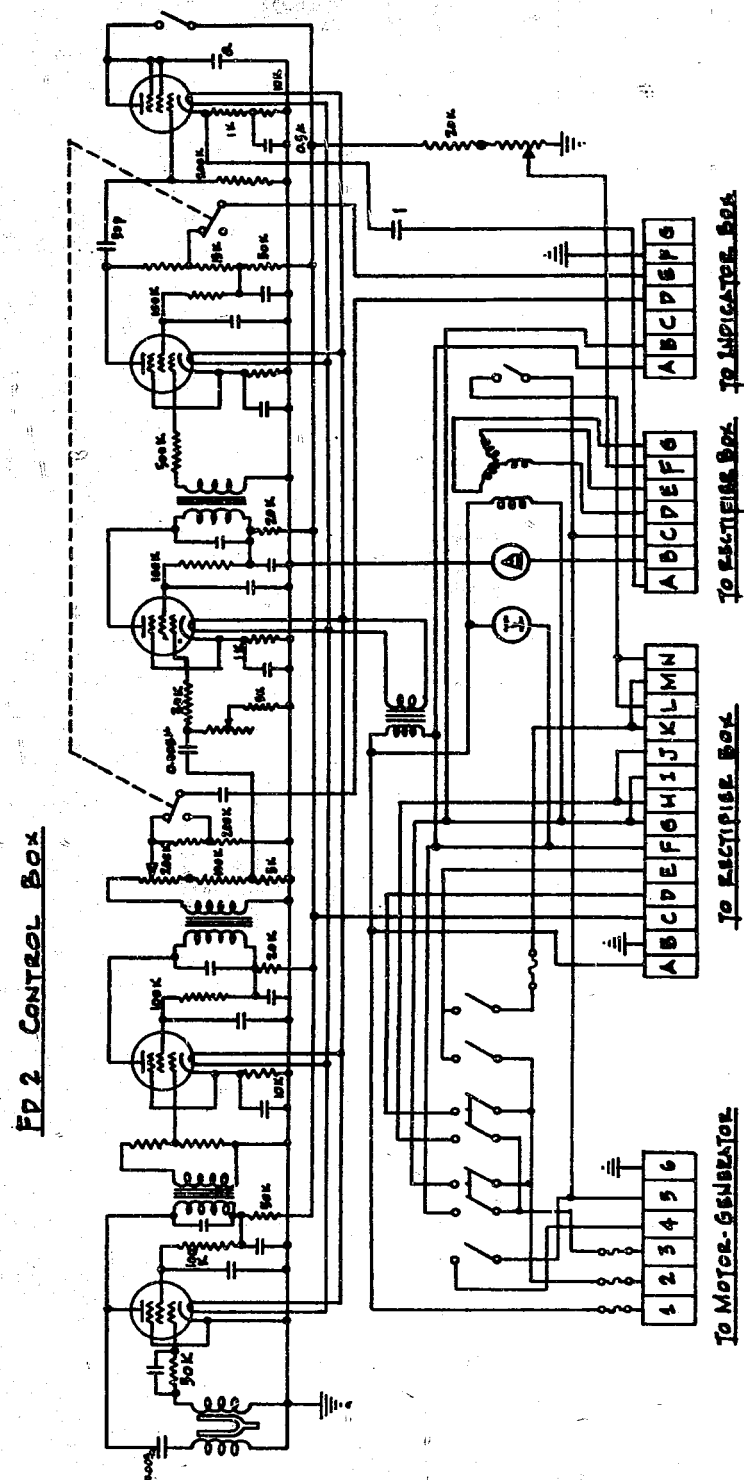
TYPE 18, MK 6, MOD 2 (FD-1) RADAR



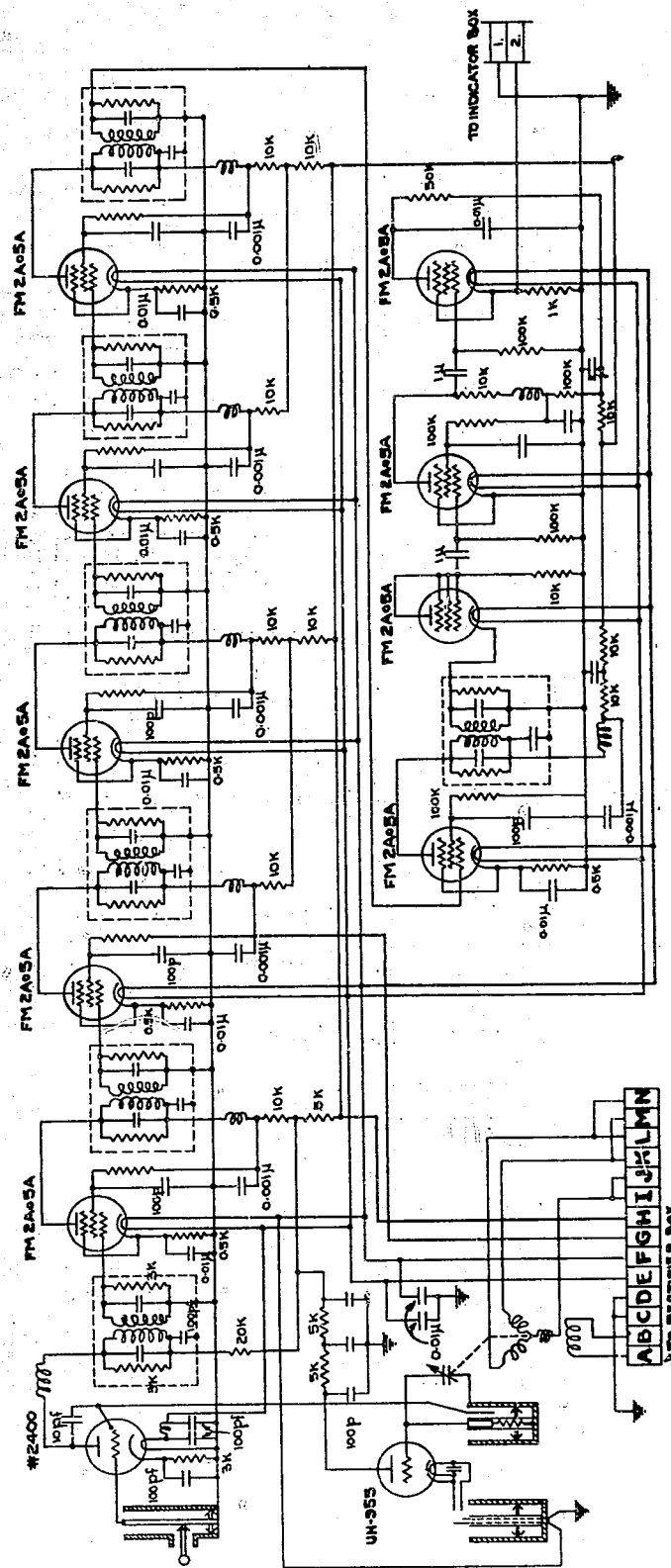
REV. 8 1945  
 PREPARED FOR THE 5th FLEET  
 U.S. NAVY  
 BY RADAR SECTION OF  
 THE 2nd AIRBORNE TROOP  
 11ST. OF TITANY

**ENCLOSURE (G)**

**TYPE 18, MK 6, (FD-2) RADAR**



ENCLOSURE (G), continued

Figure 2(G)  
RECEIVER







ENCLOSURE (G), continued

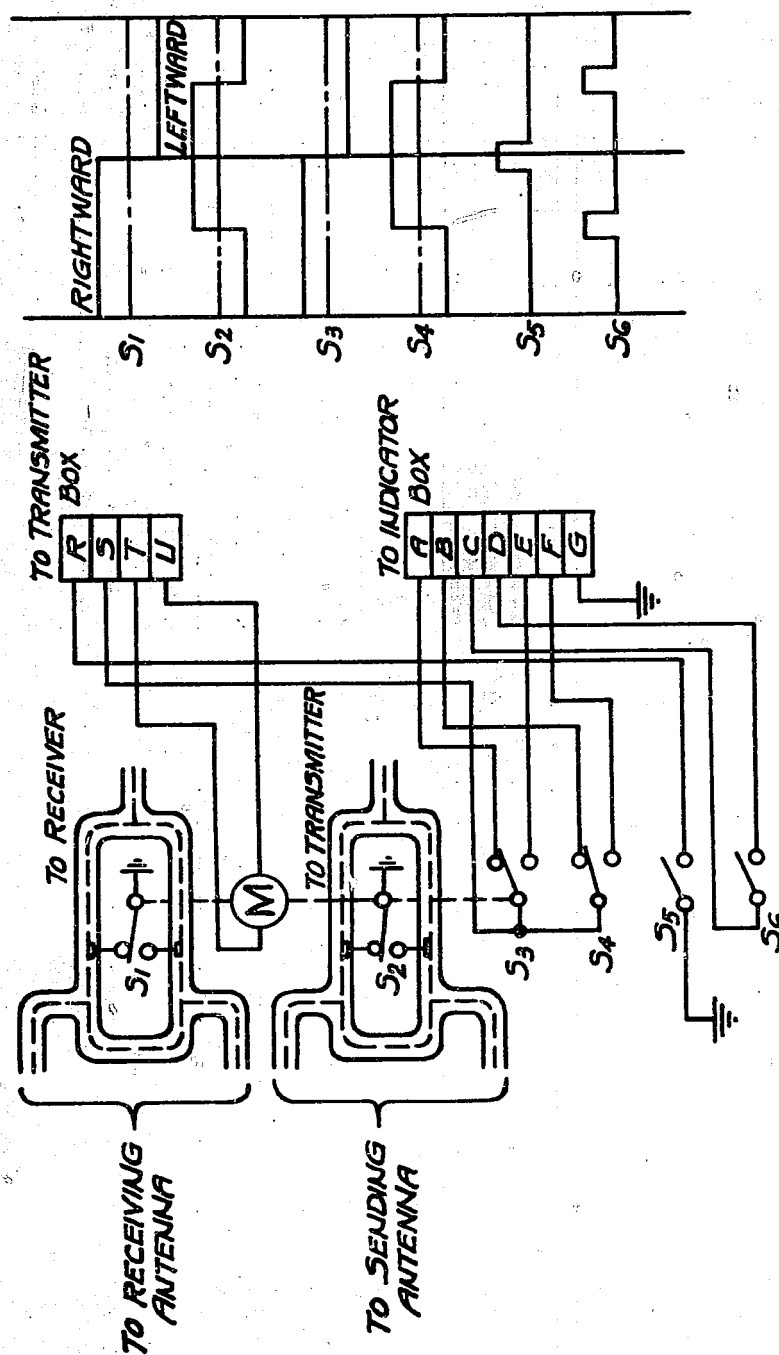
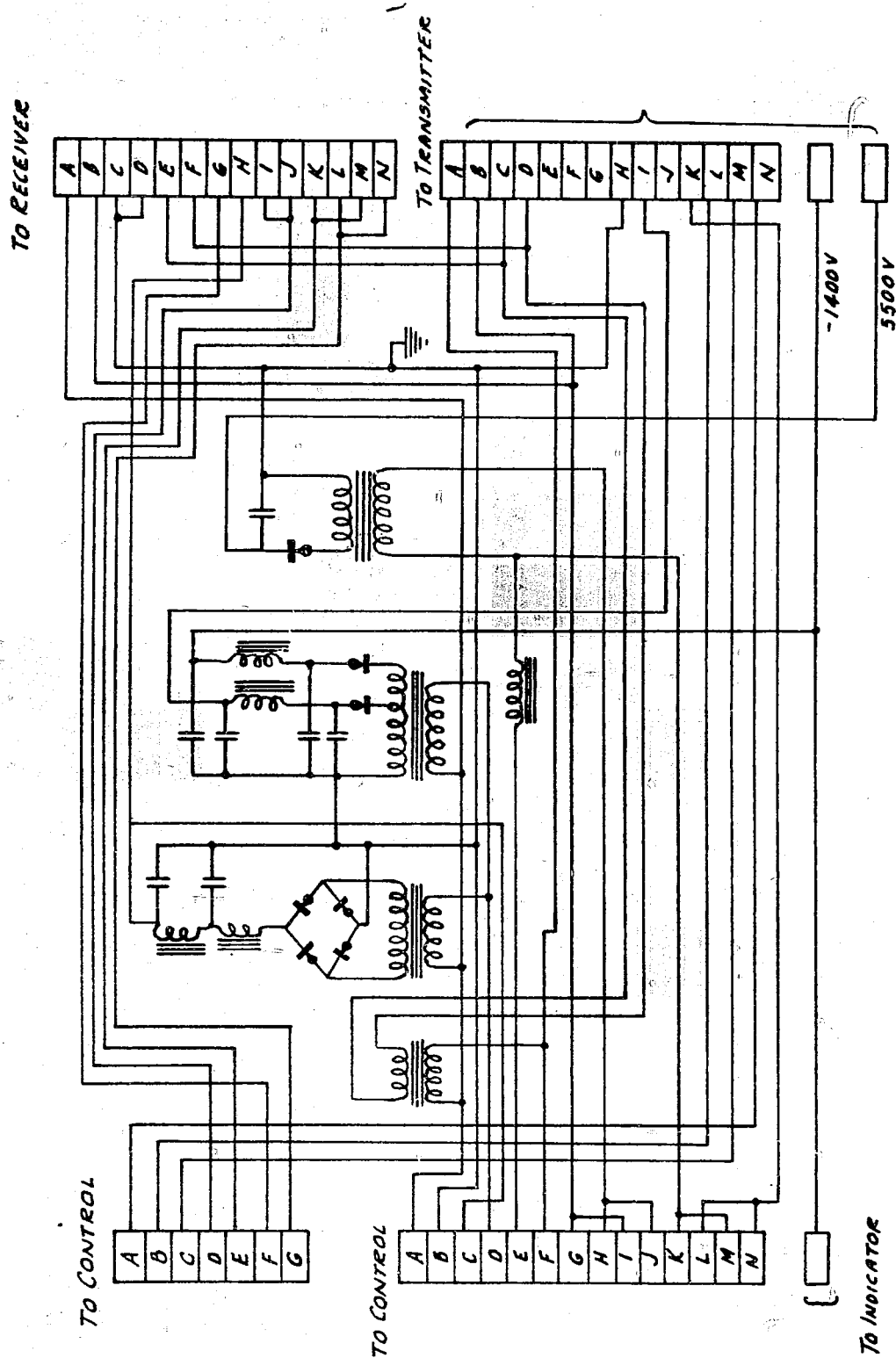


Figure 5(G)  
ANTENNA SWITCHING BOX

ENCLOSURE (G), continued

Figure 6(G)  
POWER SUPPLY

ENCLOSURE (G), continued

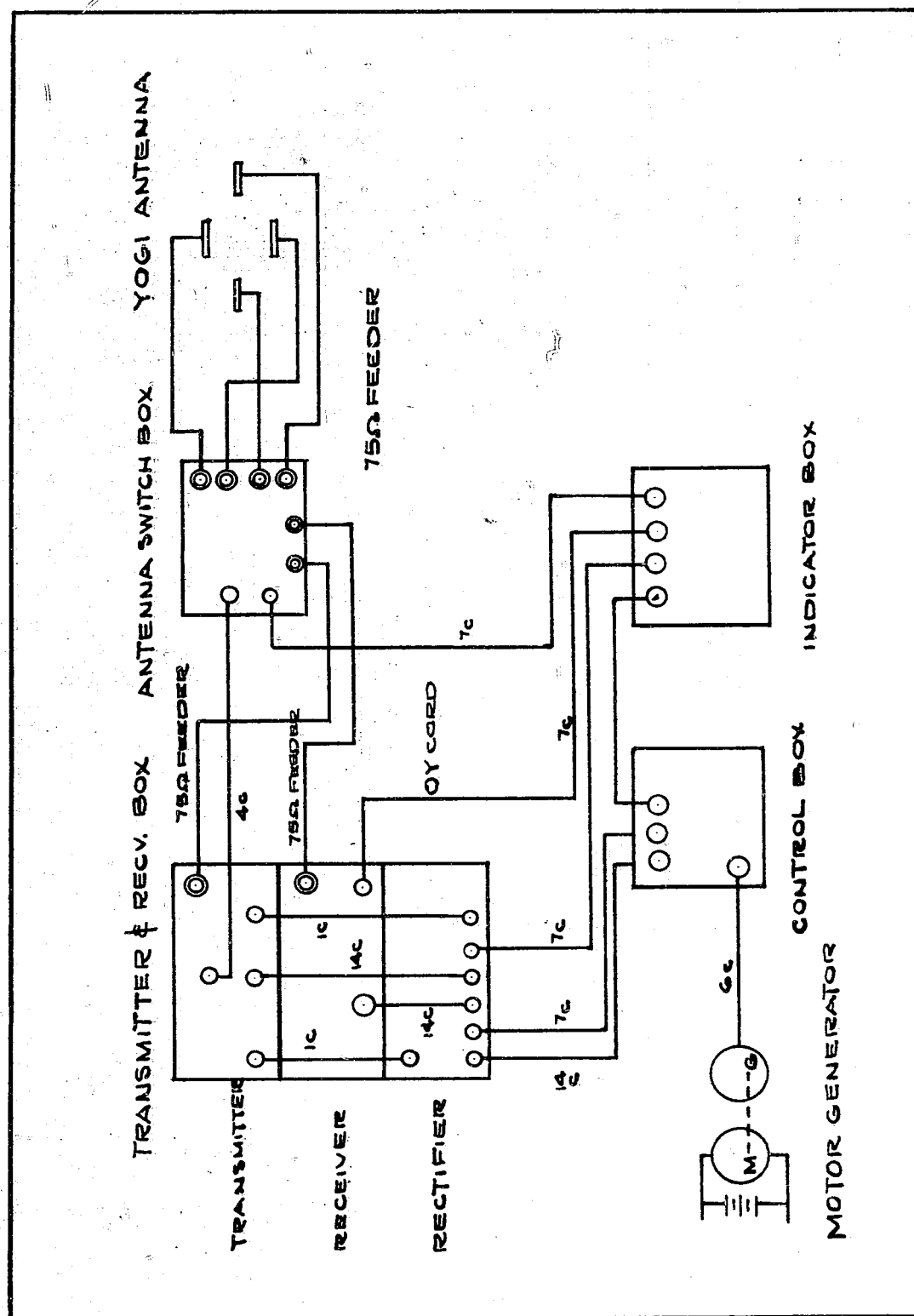


Figure 7(G)  
CONTROL CIRCUIT BLOCK DIAGRAM

## ENCLOSURE (G), continued

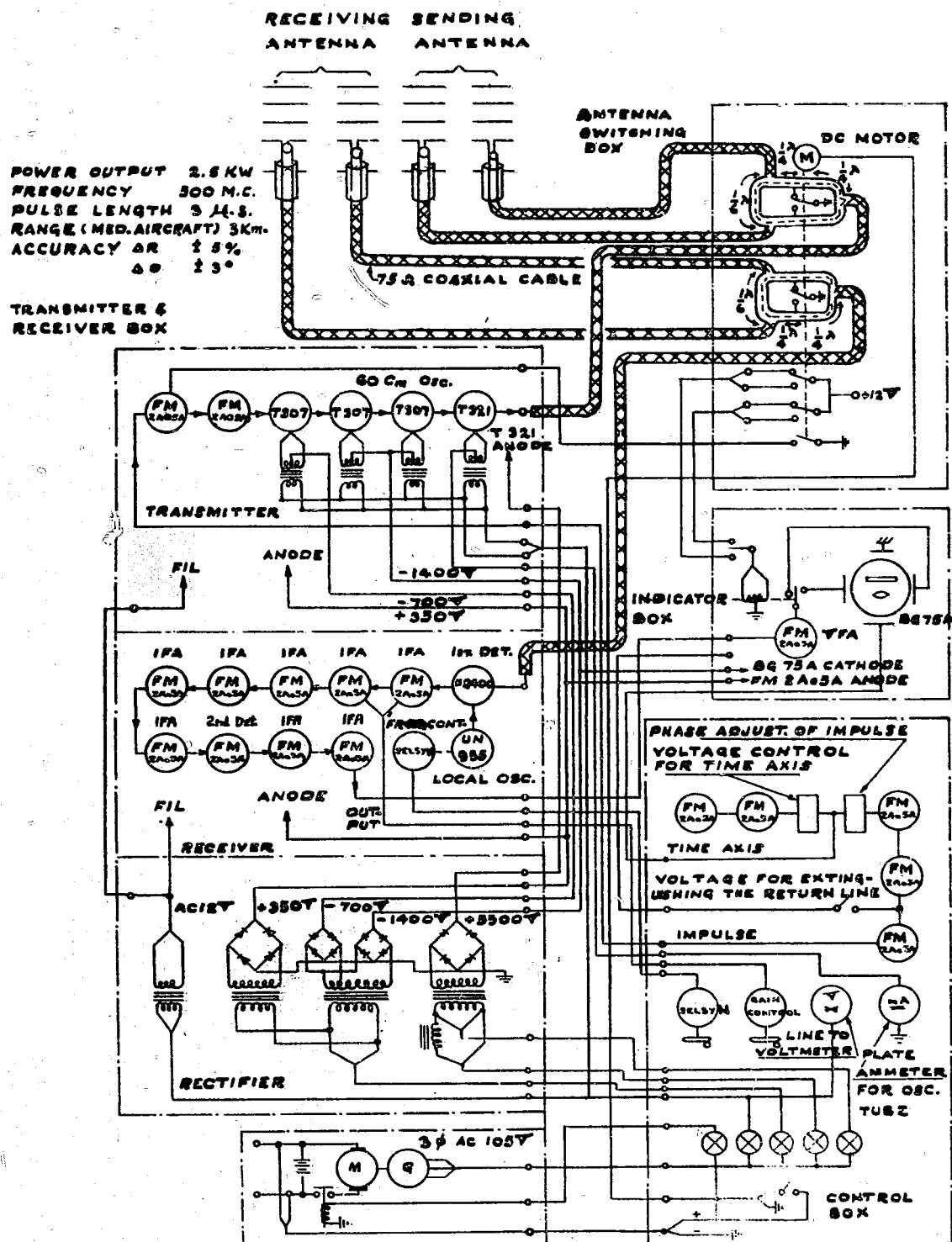
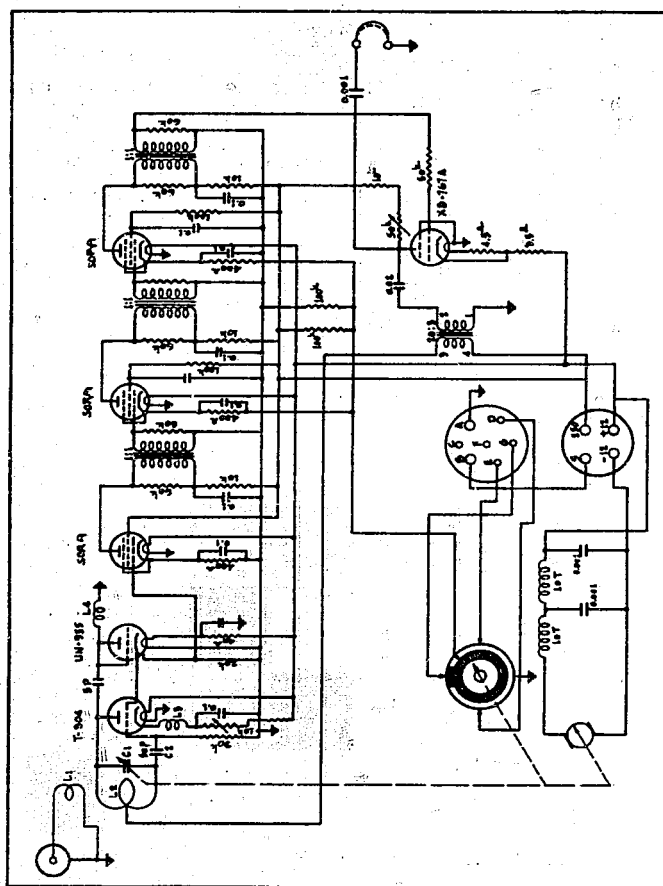


Figure 8(G)

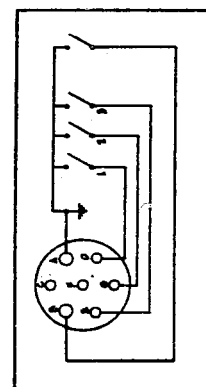
CONTROL CIRCUIT DETAIL BLOCK DIAGRAM

# ENCLOSURE (H)

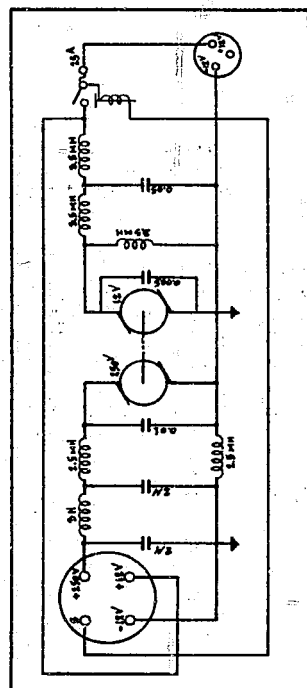
M-13 IFF



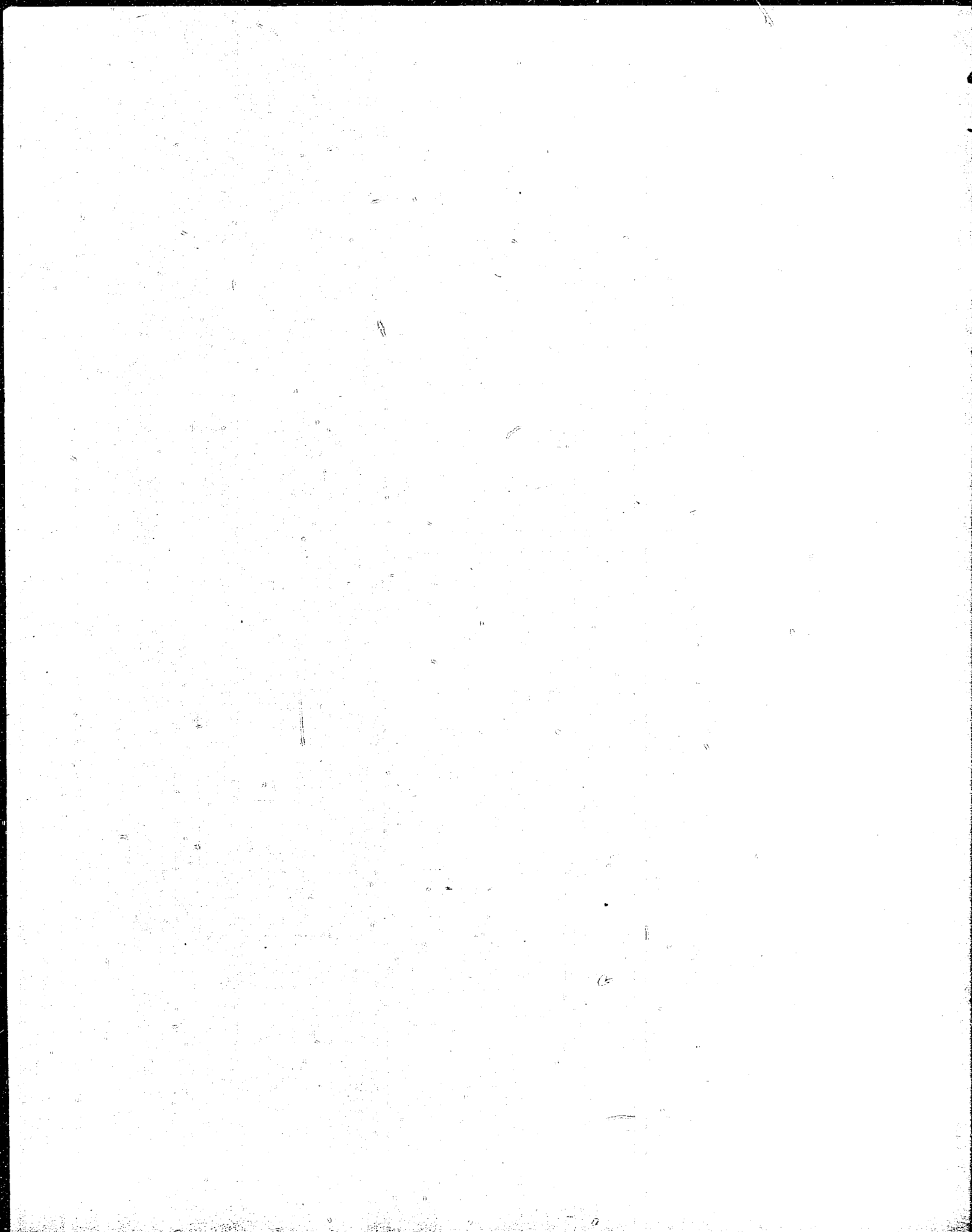
TRANSMITTER-RECEIVER



CONTROLLER



19 TEST GENERATOR





## ENCLOSURE (I), continued

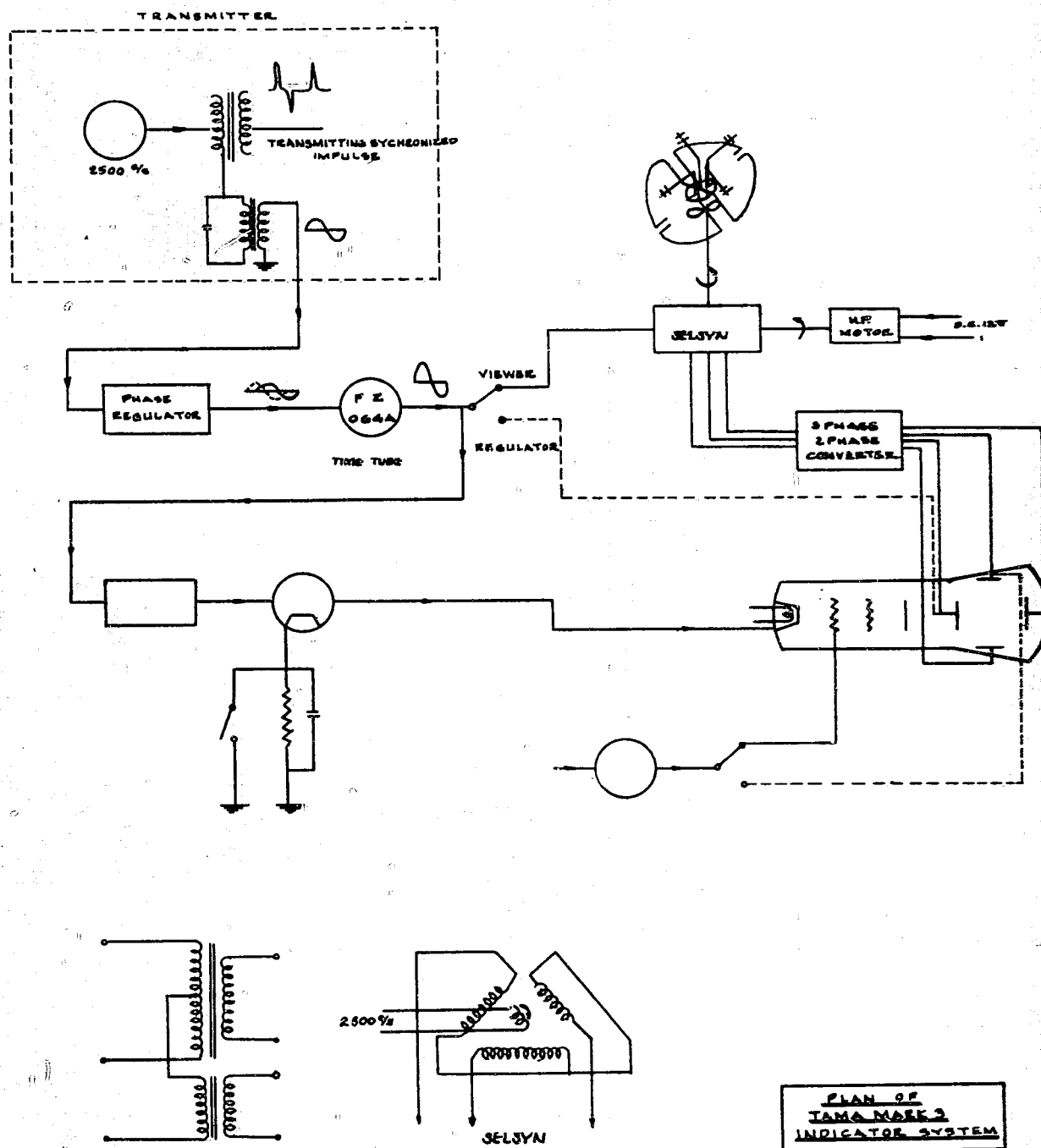
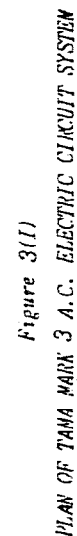


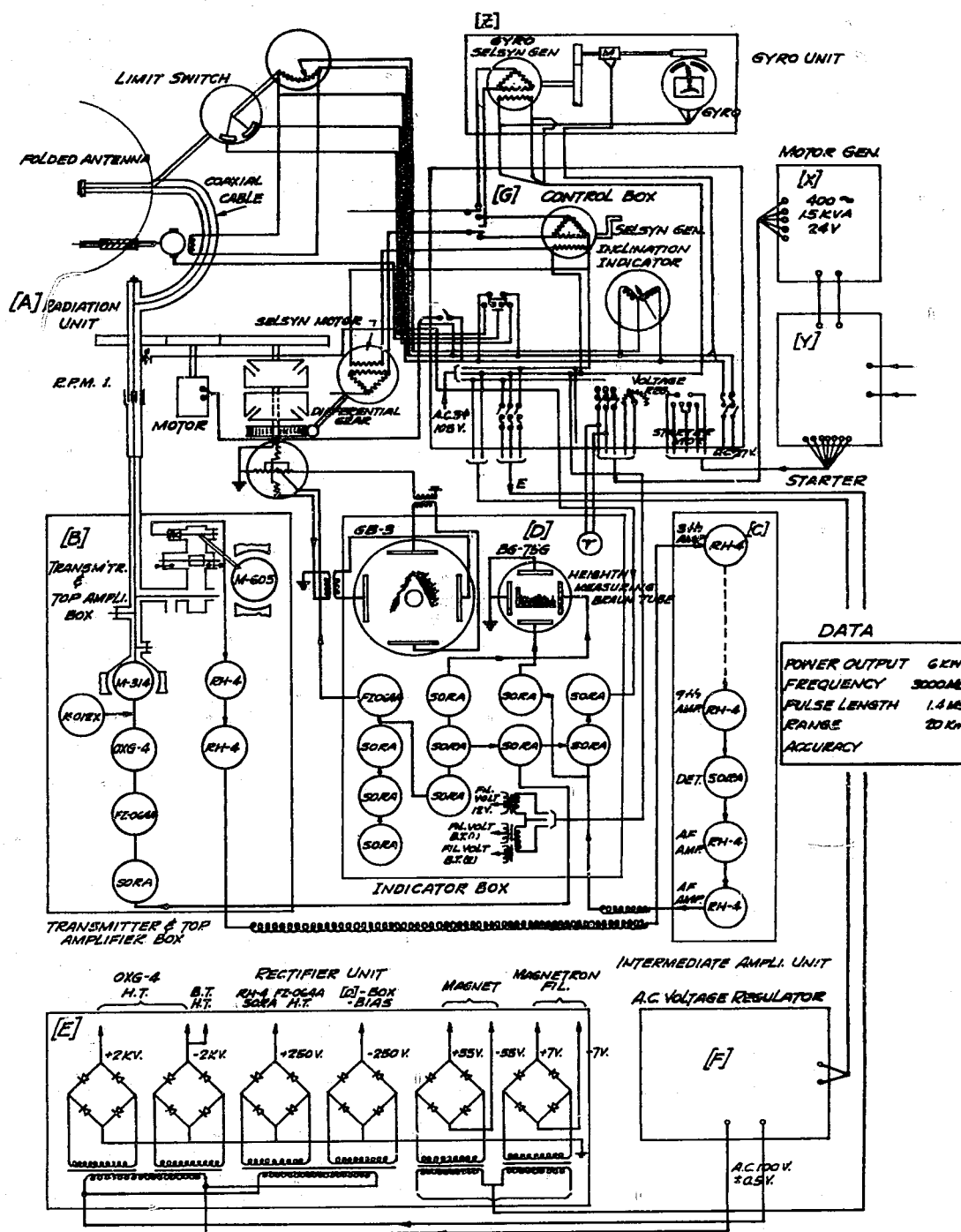
Figure 2(I)





## ENCLOSURE (J)

Type 51 Radar



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CHART OF JAPANESE AIRBORNE RADAR CHARACTERISTICS.

ENCLOSURE (K)

E-02

No.	Name	Designation	Object	Research Start- ed Fin- ished	Remarks	Installation	Frequency Wave Length (Feet)	Power Output (Watts)	Pulse Length	Modulation Frequency	Transmitter Circuit Type	Intermediate Freq.	Receiver Detector	Local Oscil- lator	Dist. Type	Scanning Rate	Scale	Type	Gain	Beam Angle		Max. Range (Miles)	Minimum Distance	Accuracy of Range	Distance Discrimination	Accuracy of Bearing	Angle Dis- crimination	Spare Parts	No. of Operators	Degree of Diffi- culty	Maintenance	No.
1	Type-3 Air Mark-5 Model-2 Radio	H-6	Patrol and search	11/41	6/42	In use	2m	3W	10/5	1000/c/s	Blocking Oscillator	U-233 42	1st UH-954 2nd RA-2054	UH-955	120	Linear	Mechan- ical	Heads: Yagi Stems: Folded Double	1600 6,500	$\theta = 30^\circ$ $\theta = 30^\circ$ $\theta = 30^\circ$	$\theta = 30^\circ$ $\theta = 30^\circ$ $\theta = 30^\circ$	180 (110 against a large ship)	3 mi (1000m)	$\pm 5\%$	200 m	$\pm 3^\circ$	$\sim 60^\circ$		Radar Technician by large plane. Observer by small	None	Ordinary	1
2	Type-4 Air Mark-5 Model-3 Radio	RA-1	Patrol and search	2/44	9/44	Out of use	2m	4.2W	19/5	250/c/s	Modulated Oscillator	T-319 42	1st UH-954 2nd 30M	UH-955	120	Sinusoidal	Mechan- ical	Heads: Yagi Stems: Folded Double	1600 6,500	$\theta = 30^\circ$ $\theta = 30^\circ$ $\theta = 30^\circ$	$\theta = 30^\circ$ $\theta = 30^\circ$ $\theta = 30^\circ$	250 (110 against a large ship)	5 mi (1000m)	$\pm 5\%$	4 m	$\pm 3^\circ$	$\sim 60^\circ$		Observer	None	Ordinary	2
3	Prototype 19 Air Mark-1 Model-12	RA-3	Patrol and search	10/44	6/45	Not yet used	2m	2W	10/5	1000/c/s	Blocking Oscillator	U-233 42	1st UH-954 2nd RA-2054	UH-955	75	Linear	Mechan- ical	Heads: Yagi Stems: Folded Double	1600 6,500	$\theta = 30^\circ$ $\theta = 30^\circ$ $\theta = 30^\circ$	$\theta = 30^\circ$ $\theta = 30^\circ$ $\theta = 30^\circ$	150 (120 against a large ship)	3 mi (1000m)	$\pm 5\%$	4-6 m	$\pm 3^\circ$	$\sim 60^\circ$		Observer	None	Ordinary	3
4	Warning Radar for Large Aircraft	RA-4	Patrol and search	6/44	7/45	Research stopped	2m	20W	20/5	1500 c/s x 11/6	Modulated Oscillator	K-2005 42	1st UH-954 2nd 30M	UH-955	120	Linear	Mechan- ical	Heads: Yagi Stems: Folded Double	1600 6,500	$\theta = 30^\circ$ $\theta = 35^\circ$ $\theta = 30^\circ$	$\theta = 30^\circ$ $\theta = 30^\circ$ $\theta = 30^\circ$	300 (150 against a large ship)	5 mi (1000m)	$\pm 5\%$	5 m	$\pm 3^\circ$	$\sim 60^\circ$		Radar Technician	None	None	4
5	Prototype 19 Air Mark-1 Model-11	H-6	Patrol and search	3/43	10/44	Not yet used	1.2m	2W	5/5	1000/c/s	Modulated Oscillator	T-319 42	1st UH-954 2nd RA-2054	UH-955	75	Logarithmic	Mechan- ical	Heads: Yagi Stems: Folded Double	1600 6,500	$\theta = 30^\circ$ $\theta = 35^\circ$ $\theta = 30^\circ$	$\theta = 30^\circ$ $\theta = 30^\circ$ $\theta = 30^\circ$	150 (140 against a large ship)	2.5 mi (1000m)	$\pm 5\%$	1.5-2 m	$\pm 3^\circ$	$\sim 60^\circ$	Number of vacuum tubes in use 43	Observer	None	Ordinary	5
6	Prototype 18 Air Mark-5 Model-2	RD-1	Patrol and search	12/43	2/44	Not yet used	60cm	2.5W	3/5	1000/c/s	Modulated Oscillator	T-321 41	1st 2A00 2nd RA-2054	UH-955	75	Sinusoidal	None	Yagi Antenna	800	$\sim 30^\circ$ $\sim 30^\circ$	$\sim 30^\circ$ $\sim 30^\circ$	75 (120 against a large ship)	600m	$\pm 5\%$	$\sim 500$ m	$\pm 0.5^\circ$	$\sim 60^\circ$	Number of Resist- ances in use 41	Pilot	None	Ordinary	6
7	Prototype 18 Air Mark-5 Model-1	RD-2	Night fighter	4/44	8/44	Not yet used	62m	2.5W	3/5	1000/c/s	Modulated Oscillator	T-321 41	1st 2A00 2nd RA-2054	UH-955	75	Sinusoidal	None	Yagi Antenna	800	$\sim 30^\circ$ $\sim 30^\circ$	$\sim 30^\circ$ $\sim 30^\circ$	75 (13 against a large ship)	600m	$\pm 5\%$	$\sim 500$ m	$\pm 0.5^\circ$	$\sim 60^\circ$	Number of Conden- sers in use 41	Pilot	None	Ordinary	7
8	Prototype 19 Air Mark-2 Model-11	RD-3	Night fighter	9/44	7/45	Not yet used	2m	3W	2/5	250/c/s	Modulated Oscillator	T-319 42	1st UH-954 2nd 30M	UH-955	75	Circular	Collimating 4" Ant. and Doublet with Condenser	2,500-3000	$\sim 30^\circ$ $\sim 30^\circ$	$\sim 30^\circ$ $\sim 30^\circ$	10 (4.5 against a large ship)	400-600m	$\pm 5\%$	$\sim 500$ m	$\pm 5^\circ$	$\sim 100^\circ$	Number of Tubes in use 43	Pilot	None	Ordinary	8	
9	Prototype 5 Model-1 IFF	H-13	IFF (Friend air- craft locating)	10/44	7/45	Not yet used	2m	50W	0.6/5		Modulated by Thyatron	T-304	UH-955			(Exponential)	L-Shaped antenna	Modulated signal				110					Number of Trans- mitters in use 41	Pilot	None	Ordinary	9	
10	Prototype Model-1 Height Measuring Radar	Ph-1	Height measure	2/45		In use	30m (30m) 0.1W		Contin- uous		Self Oscillator	T-304 4	UH-955			D.C. Amplifier	Doublet	0db				0-2000 (10m-150m)		$\pm 5\%$				Pilot Observer	None	Same as no 10	10	
11	Prototype 19 Air Mark-3 Model-30	SI	Path finder	9/44		On test	10cm	6W	14/5	600/c/s	Magnatron	H-314	1st CRY-14 2nd	UH-955	120	Circular	Doublet with Para- boic Mirror	1600	$\sim 30^\circ$ $\sim 30^\circ$	$\sim 30^\circ$ $\sim 30^\circ$	600 (200)	$\sim 1500$ m	Research incomplete	Research incomplete		Research incomplete		Radar Technician	Slight	Ordinary	11	
12	Prototype 2 Air Mark-7 Model-2	FT-B	Radar counter	1/43	5/44	Not yet used	3.7m (0.45m)											Rocket Ant. and 0 Ant.	-5-15db	$\sim 30^\circ$		Over 250				$\pm 5^\circ$	$2-5^\circ$		Radar Technician	None	1/2	12
13	Prototype 2 Air Mark-7 Model-3	FT-C	Radar counter				3.7m (0.45m)											Rocket Ant. and 0 Ant.	-5-15db	$\sim 30^\circ$		Over 250				$\pm 5^\circ$	$2-5^\circ$		Radar Technician		13	